SECTION 5. NAVAID RECEIVER TEST FACILITIES FREQUENCY ENGINEERING

41. FREQUENCY ENGINEERING FOR VOT TEST FACILITIES. A VOT is provided to give the pilot an opportunity to check the aircraft's VOR avionics on the ground before a flight. Frequency protection for VOT's is not provided in the air.

a. The frequencies used are those found in figure 1, section 1.

b. VOT FPSV's are not specifically described, except for the Area VOT (AVOT), which is described in subparagraph d.

c. The FPSV is set by FS at the time of commissioning flight check. Normally it will be set physically at some specific point on the field, usually in the "runup" area.

(1) VOT power output may not exceed 2 watts, and may be somewhat less, depending on flight inspection determination of necessary local airport coverage.

(2) VOT cochannel separation from another VOT is that distance required to assure they are beyond RLOS to each other.

d. An AVOT is a VOT whose power may exceed 2 watts, and is intended to be received in the air, or if installed at an elevated site, to cover several airports. Although it emits a special VOT signal which only tests VOR receivers, it can cause interference to other cochannel and adjacent channel operational facilities. Frequency engineering is done in the same manner as with any two VOR's and depends on the power and service volumes of the facilities involved.

42. FREQUENCY ENGINEERING FOR SECONDARY RECEIVER TEST FACILITIES. Other ground-based receiver test facilities also may radiate low power signals to test the whole NAVAID (VOR, ILS, DME, ATCRBS) system aboard an aircraft, including the antenna. They are commonly called "test generators" or "ramp testers" and are located in and operated by Fixed Base Operators or airlines facilities on an airport, and FAA FI facilities. They are restricted as follows:

a. If operated by a non-Federal entity, they must be licensed by FCC.

b. If operated by a Federal agency (including military and FAA), they must be authorized by NTIA/IRAC.

c. They may operate only on the following frequencies:

(1) 108.00/978, 108.05/1104 MHz for VOR/DME test, 1 W maximum.

(2) 108.10/334.70/979 MHz, for ILS/DME test, 1 W maximum.

(3) 108.15/334.55/1105 MHz, for 50 kHz ILS channel, 100 mW maximum.

(4) 1030/1090 MHz for ATCRBS Beacon and Transponder, 1 W maximum.

The PRR must be 235 pps ±5 pps.

d. If interference is caused to operational facilities by any of these secondary test facilities, the user and ASR shall be notified immediately.

e. If interference is received by aircraft in the normal testing area from nearby or strong FM Broadcast stations, a frequency other than those listed in subparagraph c above may be assigned, upon coordination with ASR.

43. VOT FREQUENCY ENGINEERING BY THE TABLE METHOD. The tables and diagram in figures 155-157 may be used for VOT frequency engineering. If the indicated cochannel mileages are not exceeded, and the adjacent channels are compliant with paragraph 7 of this appendix, the frequency request may be filed without further study. Note that the highest power in figures 155 and 157 is 20 dBW (100 W) EIRP. Since there usually is 1.5-2.0 dB loss in cable and connectors, this encompasses VOR's of 150/200 W normal operating power closely. Differences can be interpolated.

FIGURE 155. COCHANNEL SEPARATION OF VOT AND OPERATING VOR'S

VOR CLASS	--------VOR EIRP---------- 20 dBW	17 dBW	14 dBW
	SEPARATION FROM VOR'S (nmi)		
H	355	375	386
L	150	162	172
T	105	111	120

FIGURE 156. LOC RADII DEFINED, COCHANNEL
(Note: this cochannel is the same as figure 65.)

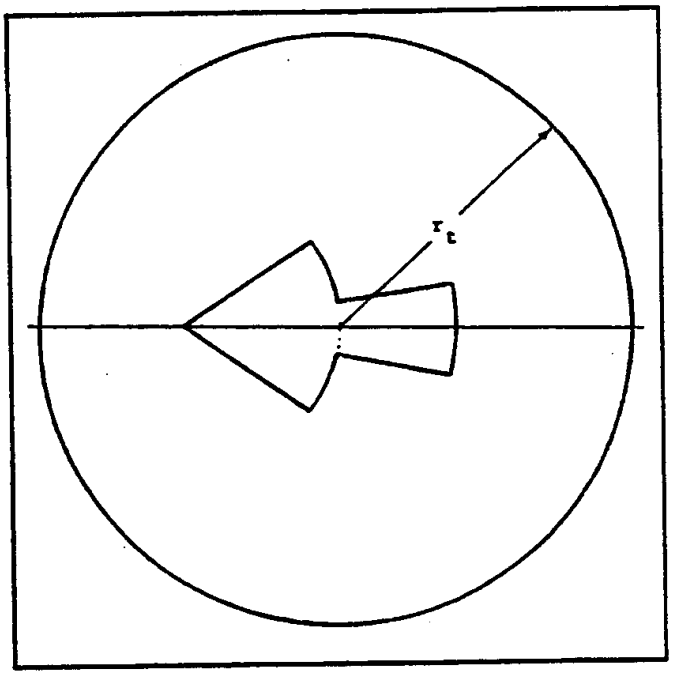


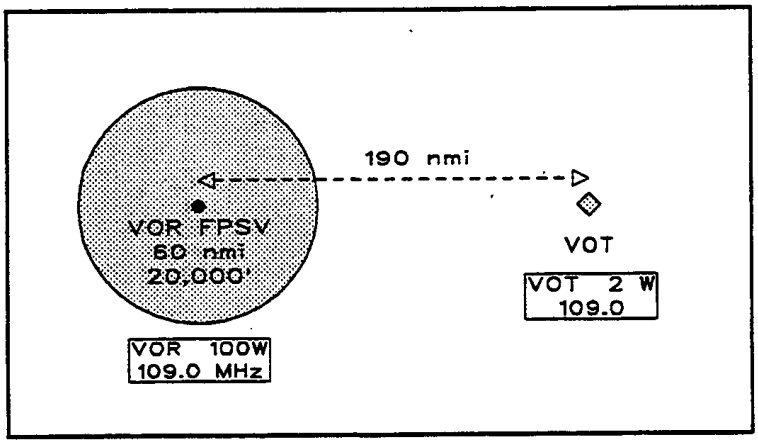
FIGURE 157. COCHANNEL SEPARATION OF ILS AND ILS-TEST

VOR CLASS	--------ILS EIRP---------- 20 dBW		17 dBW		14 dBW	
	(nmi)					
	r_1	r_2	r_1	r_2	r_1	r_2
STD & OPT B	11	32	13	35	16	38
OPTS A & C	19	43	22	49	24	54

44. VOT FREQUENCY ENGINEERING BY THE CALCULATION METHOD. The required distance separation may also be determined by calculation. This is needed when there is a nonstandard FPSV or ESV on the cochannel operating facility. A graphical sample is shown in figure 158.

A nonstandard VOR FPSV of 60 nmi radius @ 20,000_ is assumed. Appropriate facility separation curves will be found in figures 159 through 161.

FIGURE 158. VOR VERSUS COCHANNEL VOT BY CALCULATION



a. Calculate the EIRP of the operating VOR as follows:

VOR output = 100 W	= +20.0 dBW
VOR antenna gain	= +2 dbi
VOR cable and connector losses	= -2.5 dB
VOR ERP	= +19.5 dBW

b. Use figure 151, the closest separation curve on the high protection side for VOR/VOT.

c. Determine the required separation by interpolation. Since this is a cochannel problem, the highest altitude of the FPSV will be used. Locating the intersection of the 20,000_ altitude line and the 60 NM line, interpolation will show the required separation to be 190 NM.

45. thru 50. RESERVED.